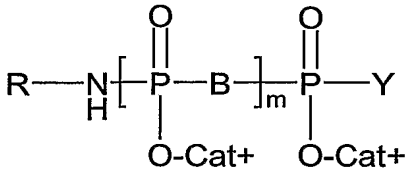
CLAIMS

1. A γδ T cell activator of formula (I) :



Formula (I)

wherein Cat+ represents one (or several, identical or different) organic or mineral cation(s) (including proton);

m is an integer from 1 to 3;

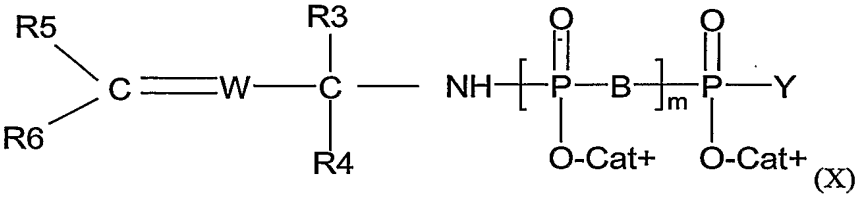
B is O, NH, or any group capable to be hydrolyzed;

Y = O⁻Cat+, a C_1-C_3 alkyl group, a group -A-R, or a radical selected from the group consisting of a nucleoside, an oligonucleotide, a nucleic acid, an amino acid, a peptide, a protein, a monosaccharide, an oligosaccharide, a polysaccharide, a fatty acid, a simple lipid, a complex lipid, a folic acid, a tetrahydrofolic acid, a phosphoric acid, an inositol, a vitamin, a co-enzyme, a flavonoid, an aldehyde, an epoxyde and a halohydrin;

A is O, NH, CHF, CF_2 or CH_2; and,

R is a linear, branched, or cyclic, aromatic or not, saturated or unsaturated, C_1-C_{50} hydrocarbon group, optionally interrupted by at least one heteroatom, wherein said hydrocarbon group comprises an alkyl, an alkylenyl, or an alkynyl, preferably an alkyl or an alkylene, which can be substituted by one or several substituents selected from the group consisting of : an alkyl, an alkylenyl, an alkynyl, an epoxyalkyl, an aryl, an heterocycle, an alkoxy, an acyl, an alcohol, a carboxylic group (-COOH), an ester, an amine, an amino group (-NH_2), an amide (-$CONH_2$), an imine, a nitrile, an hydroxyl (-OH), a aldehyde group (-CHO), an halogen, an halogenoalkyl, a thiol (-SH), a thioalkyl, a sulfone, a sulfoxide, and a combination thereof.

2. The γδ T cell activator according to claim 1, wherein said activator is a compound of formula (X) :

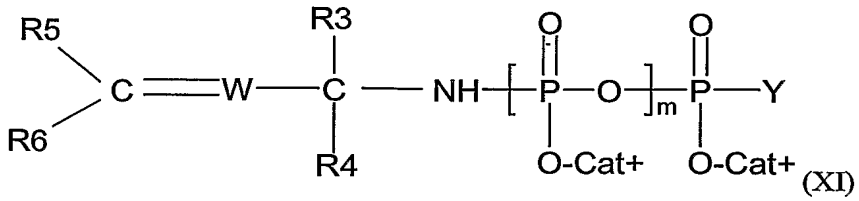


(X)

in which R_3, R_4, and R_5 , identical or different, are a hydrogen or (C_1-C_3)alkyl group, W is –CH- or –N-, R_6 is an (C_2-C_3)acyl, an aldehyde, an (C_1-C_3)alcohol, or an (C_2-C_3)ester, Cat+ represents one (or several, identical or different) organic or mineral cation(s) (including the proton), B is O or NH,

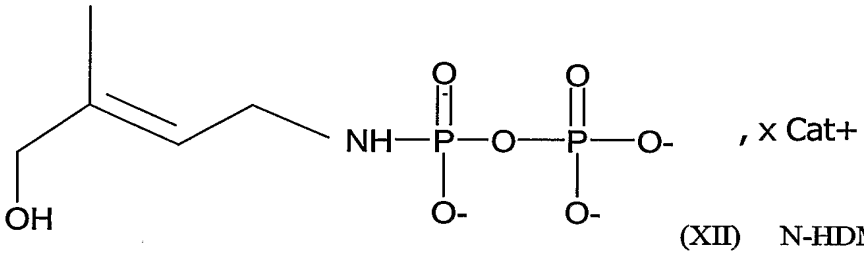
m is an integer from 1 to 3, and Y is O⁻Cat+, a nucleoside, or a radical –A-R, wherein A is O, NH, CHF, CF_2 or CH_2, and R is selected from the group consisting of 1), 2) or 3).

3. The γδ T cell activator according to claim 2, wherein said activator is a compound of formula (XI)



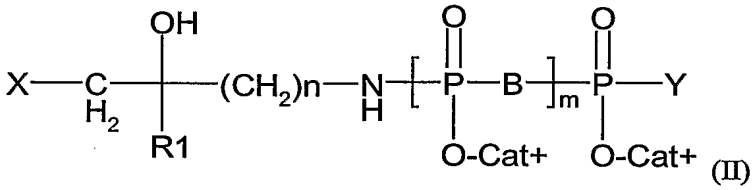
(XI)

4. The γδ T cell activator according to claim 3, wherein said activator is is a compound of formula (XII)



(XII) N-HDMAPP

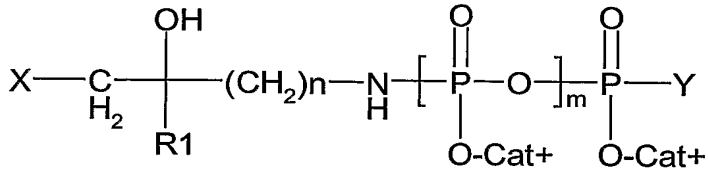
5. The γδ T cell activator according to claim 1, wherein said activator is a compound of formula (II) :



(II)

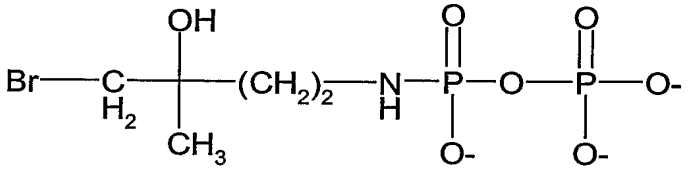
in which X is an halogen (preferably selected from I, Br and Cl), B is O or NH, m is an integer from 1 to 3, R1 is a methyl or ethyl group, Cat+ represents one (or several, identical or different) organic or mineral cation(s) (including the proton), and n is an integer from 2 to 20, and Y is O⁻ Cat+, a nucleoside, or a radical –A-R, wherein A is O, NH, CHF, CF_2 or CH_2 and R is selected from the group consisting of 1), 2) or 3).

6. The γδ T cell activator according to claim 5, wherein said activator is a compound of formula (III)



(III)

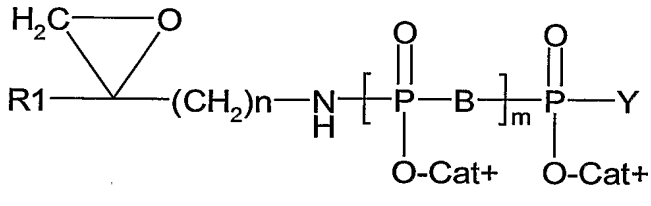
7. The γδ T cell activator according to claim 5, wherein said activator is a compound of formula (V)



(V)

N-BrHPP

8. The γδ T cell activator according to claim 1, wherein said activator is a compound of formula (VI) :



(VI)

in which R1 is a methyl or ethyl group, Cat+ represents one (or several, identical or different) organic or mineral cation(s) (including the proton), B is O or NH, m is an integer from 1 to 3, and n is an integer from 2 to 20, and Y is O^-Cat+, a nucleoside, or a radical –A-R, wherein A is O, NH, CHF, CF_2 or CH_2, and R is selected from the group consisting of 1), 2) or 3).

9. A pharmaceutical composition comprising a γδ T cell activator according to any one of claims 1-8.

10. Use of a γδ T cell activator according to any one of claims 1-8 for the manufacture of a pharmaceutical composition for regulating γδ T cells in a human subject.

11. Use of a γδ T cell activator according to any one of claims 1-8 for the manufacture of a pharmaceutical composition for treating a subject suffering from or susceptible to suffering from a cancer, an infectious disease, an autoimmune disease or an allergic disease.

12. Use according to claim 11, wherein said cancer is a solid tumor.

13. Use of a γδ T cell activator according to any one of claims 1-8 as a vaccine adjuvant.

14. A vaccine composition comprising a γδ T cell activator according to any one of claims 1-8 as a vaccine adjuvant.

15. A method for preparing a diphosphoramidate monoester compound comprising:

(a) reacting an alkylhalide R-X in a coupling step with a diethylphosphoramidate or diethylchlorophosphate reagent;

(b) reacting the compound prepared in step (a) in a saponification step thereby removing O-ethyl groups; and

(c) reacting the compound prepared in step (b) in a phosphorylation step thereby preparing a diphosphoramidate monoester,

wherein R is a linear, branched, or cyclic, aromatic or not, saturated or unsaturated, C1-C50 hydrocarbon group, optionally interrupted by at least one heteroatom, wherein said hydrocarbon group comprises an alkyl, an alkylenyl, or an alkynyl, preferably an alkyl or an alkylene, which can be substituted by one or several substituents selected from the group consisting of : an alkyl, an alkylenyl, an alkynyl, an epoxyalkyl, an aryl, an heterocycle, an alkoxy, an acyl, an alcohol, a carboxylic group (-COOH), an ester, an amine, an amino group (-NH2), an amide (-CONH2), an imine, a nitrile, an hydroxyl (-OH), a aldehyde group (-CHO), an halogen, an halogenoalkyl, a thiol (-SH), a thioalkyl, a sulfone, a sulfoxide, and a combination thereof, and

wherein X is a moiety capable of being displaced by a diethylphosphoramidate group under suitable conditions.

16. The method of Claim 15 wherein X is an NH2 group and said R-X compound is reacted in a coupling step with a diethylchlorophosphate compound.

17. The method of Claim 15 wherein X is selected from the group consisting of I, Br and Cl.

18. A method of preparing a (E)-2-(4-azido-2-methylbut-2-en yloxy)tetrahydro-*2H*-pyran compound, comprising providing a (E)-2-(4-Chloro-2-methylbut-2-en yloxy)tetrahydro-*2H*-pyran compound and reacting said compound with a sodium azide in a water-pentane biphasic mixture in the presence of phase transfer catalyst.

19. A method of activation a γδ T cell, the method comprising bringing a γδ T cell into contact with a γδ T cell activator according to any one of claims 1-8.

20. The method of claim 19 wherein the γδ T cell is brought into contact with said γδ T cell activator in vitro.

21. A γδ T cell activated according to a method of claims 19 or 20.

22. Use of a γδ T cell according to claim 21 for the manufacture of a pharmaceutical composition.